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Parente and Prescott's Theory May Work in Practice But Does Not Work in Theory

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Parente and Prescott's Theory May Work in Practice But Does Not Work in Theory*

Guido Cozzi and Luis-Felipe Palacios

Abstract

In this paper we challenge Parente and Prescott's (1999) theoretical framework, which establishes that unions use their control of "work practices" to thwart the efficient use of technology in the firms. We argue instead that unions, despite endowing monopoly rights over a technology, should tend to impose its efficient use. In fact if union members care about labor disutility, along with wage incomes, they will dictate "work practices" consistent with operating technology at full efficiency, in order to allow workers to enjoy more leisure. Our result is more general than Parente and Prescott's and does not rely on the particular specification of preferences.

KEYWORDS: Trade Unions, Inefficiency, Technological Change, Institutions and Growth

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1. Introduction

One of the most controversial issues in economic development and industrial relations is the possible hostility of the coalitions of factor owners to the adoption of leading-edge technologies. In an influential paper, Parente and Prescott (1999) (PP from now) introduced an innovative model that still represents the state of the art in this literature, and is characterized by two important results:

1. Labor unions use their control of the current "work practices" to obstruct the efficient use of the technology in the firms.
2. Labor unions use their size and their efficacy in collective action to commit workers to a particular sector, in order to impede the introduction of new and more productive technologies.

Here we argue against PP's first conclusion analyzing cases in which workers in fact do care about leisure. The economic intuition for our result relies on the very notion of labor productivity: any efficiency gain allows workers to get at least the same income in a shorter working time. Although it is difficult to find data supporting our claim, it is possible to examine historical examples of unions demanding the reduction of working hours, such as trade unions' struggle for the eight-hour workday in the US and in several European countries over the last two centuries. A more recent example is the demand for higher wages and shorter work hours (11 to 8 hours) by Mexican immigrants working at green groceries in New York City (New York Times, February 15, 2001). In another recent case, the dockworker's union "West Coast Longshoremen" seems to have reaped rents in the form of both higher hourly wages and higher leisure off the job.

Our result does not rely on particular functional specifications of the disutility of labor; nor does it rest on specific ranges of parameter values. Instead we derive our results from basic economics.

We will prove our main result in Section 2. In Section 3 we conclude.

2. Does the Inclusion of Leisure Imply an Efficient Use of Technology?

A general description of PP's (1999) model is the following: Each industrial good can be produced by using three constant returns to scale technologies, 0, 1, and 2, which require only labor as an input and which are characterized by their average

and marginal productivity $\pi_0 < \pi_1 < \pi_2$.¹

Industry i 's trade union is assumed to have monopoly rights on the use of technology 1: if a firm wants to use it, only union members can be hired to operate it. Therefore the union will dictate both their wage, w_x , and their (common) efficiency level $\pi_x \leq \pi_1$. Hence the union is able to control the "work practices" associated with the use of technology 1. This is their definition of "monopoly rights". Notice that there is a union in every industry and that there are an infinite number of coalitions, each holding this kind of power over the corresponding technology.²

There is free entry of price competing firms into each industry. Each firm that is not willing to accept the union's terms of use for technology 1 can freely use the less productive technology 0 and hire as many workers as it wishes out of the named "agricultural" sector by paying them w_a .³

In order to derive their second result (the "non-adoption" result), PP focus on the alternative to these two technologies, which is technology 2. Technology 2 is the most productive, but its use is not free, because firms are assumed to be forced to pay a fixed initial cost (an "entry fee") that is proportional to the number of workers in the economy. This is the assumption of "resistance to technological adoption" by the whole labor force, and not only by industry i . Moreover, coalition members are committed to work in the coalition's industry for the current period, while nonmembers are perfectly mobile across industries. The "entry fee" is responsible for the non-adoption of technology 2 in the equilibrium of the game, which exists for a specific set of parameters.⁴

Again according to PP's model, preferences are assumed, such that the demand function $D(p)$ for the industry's product is always (imperfectly) inelastic; that is, the total industry revenue $pD(p)$ is always increasing in $p > 0$. It obviously follows that the union, in order to maximize its members' average wage, w_x , will dictate

¹For the purpose of this study we will focus on the instantaneous partial equilibrium for the single generic industry $i \in [0, 1]$.

²We are talking about "technology 0, 1, and 2", because we are focusing on a single industry i , but the reader should keep in mind that in this model there is a continuum of industries, and hence an uncountable number of such technologies, each owned by an uncountable number of zero measure coalitions holding the corresponding "monopoly rights".

³Of course it will never do so along the equilibrium path.

⁴Literally speaking, the "monopoly rights" only regard the right of the union to control the use of technology 1, while the additional "resistance" and "commitment" assumptions are theoretically different ingredients, needed to derive the non-adoption result.

"work practices" so that the price of the product is the highest. The highest price is not to exceed the average and marginal cost of the potential competitors, such that this price will equal w_a/π_0 while the amount demanded will equal $D(w_a/\pi_0)$.⁵

What "work practices" should the union impose on firms willing to use technology 1? Theoretically, the union can implement two possible maximization strategies:

1. The union can set the duration (or the intensity) of the working day to a fraction $t < 1$ and then use technology 1 at its full potential so that the relation: $\pi_1 N_x t = D(w_a/\pi_0)$ holds.
2. The union can set the productivity of each worker who operates technology 1 at an inefficient level $\pi_1(x) < \pi_1$ so that the relation: $\pi_1(x) N_x = D(w_a/\pi_0)$ holds.⁶

In our analysis of the labor market we assume that individuals enjoy leisure. Hence we conclude:

Proposition 2.1. *If the utility of the workers increases with leisure, then technology 1 will always be operated efficiently.*

Proof. The total wage income per union member, w_x , is the same under both alternatives, $w_x = \frac{D(w_a/\pi_0)w_a/\pi_0}{N_x}$. On the other hand, the value of leisure is non-negative under alternative 1 and zero under alternative 2.⁷ Hence, if the utility of the workers increases with leisure, union members are better off under alternative 1 than under alternative 2. Therefore, a rational union will dictate efficient use of technology 1, but a working day lower than or equal to 1.

Remark. It is important to note that the result of Proposition 1 is general: it does not depend on any particular specification of the disutility of labor. So long as workers care about leisure it will always hold.

The following Corollary makes plain the relation between the previous Proposition and PP's result:

Corollary 2.2. *Only if workers do not care at all about leisure is the union indifferent between operating technology 1 efficiently and operating it inefficiently.*

Proof. From the previous analysis.

⁵The new entrants can always freely use technology 0 associated with the lower productivity.

⁶For both strategies, N_x (the union size) is assumed large enough to produce the total quantity demanded, $\pi_1 N_x \geq D(w_a/\pi_0)$.

⁷If $\pi_1 N_x t = D(w_a/\pi_0)$ and $\pi_1 N_x = D(w_a/\pi_0)$ then $1 = t$.

3. Final Remarks

In this paper we have proved, in a rather more general framework than PP's, that worker unions holding monopoly rights over a technology will tend to use their power to impose the efficient use of the technology. Therefore, our claim seems to undermine PP's result that unions resist the efficient use of technology. If workers value leisure, they will prefer reducing working time through the use of technology to its full potential.

Of course, leisure is a "barrier to riches". The GDP per worker would decrease both according to our model (where monopoly rights restrict output by increasing leisure) and according to PP's model (where unions prevent the use of technology at full potential). Of course, also, "riches" and "welfare" are not the same. The welfare losses generated by lower output would be compensated, in part, by the gain in leisure.

It is important to remark that our result critically hinges on the assumption that the workweek belongs to the "work practices" under the domain controlled by the trade unions. Though this assumption could be appropriate in some cases (as indicated in the Introduction) it could seem a bit extreme in other cases. Clearly, it is difficult to prove with concrete data who has the "power" to regulate hours. However, if one thinks that unions do not have influence over work hours, one ought to propose an explanation as to why that might be, since the underlying reason for it may well influence the analysis of how unions deal with technological change.⁸ A theory of this sort would also need to explain why the public would be willing to accept inefficient technology use but not lower work hours. It is an entirely open question, and an interesting one for further research, why this would be the case. Why do labor unions not seem to reap their rents in the form of leisure off the job? Perhaps in a more general framework, the answer could be that a government will only grant and protect monopoly rights of a group if there is sufficient public support for this policy. But if the public were to learn that union members work fewer hours than average, the union would risk losing its protection. Thus, even if the monopoly rights were to include the right to set the workweek length, a labor union might not want to exercise this right.

Reinterpreting and extending our result in light of such institutional and political-economy considerations may help illuminate the findings in Schmitz (2003). He discusses the question why workers seem to capture rents both by resisting effi-

⁸According to Pencavel (1991, p.45-49), labor unions have pursued reductions in workweek length primarily in declining industries.

cient work rules and by taking more on-the-job leisure, rather than by taking more off-the-job leisure. Schmitz argues that there are political constraints on receiving very high hourly wages. The industry could be subsidized less and/or taxed more, and the unions could receive less political and popular support. Schmitz describes how various work rules (e.g., narrow job classification) serve to enforce under-utilization of workers (i.e., promote leisure on the job).

The introduction of a more realistic assumption for the labor market highlights the need to go beyond PP to explain why workers do thwart technology adoption rather than enjoy more leisure. We believe that this is an important task for future research.

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